(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 334 610 B1**

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **09.03.94**

(51) Int. Cl.5: **H01R 13/629**

(21) Application number: **89302801.9**

(22) Date of filing: **21.03.89**

(54) Breakaway electrical connector.

(30) Priority: **24.03.88 GB 8807007**

(43) Date of publication of application:
27.09.89 Bulletin 89/39

(45) Publication of the grant of the patent:
09.03.94 Bulletin 94/10

(84) Designated Contracting States:
DE FR GB

(56) References cited:
US-A- 3 599 167
US-A- 4 684 192

(73) Proprietor: **THE WHITAKER CORPORATION**
Suite 450,
4550 New Linden Hill Road
Wilmington, Delaware 19808(US)

(72) Inventor: **Meller, Andrew Graham**
12 Grayling Court
Grange Road
Ealing London, W5(GB)

(74) Representative: **Warren, Keith Stanley et al**
BARON & WARREN
18 South End
Kensington
London W8 5BU (GB)

EP 0 334 610 B1

Description

The present invention relates to an electrical connector for use in high altitude applications with both power and data signals.

A problem which exists in aircraft electrical connectors, specifically with high voltage contacts, is that high altitude environments causes a vacuum which in turn enhances sparking of relatively low level power sources. These sparks could degrade or destroy the surrounding or neighboring data contacts and their associated signals when the voltages jump gaps within the connectors. It is a requirement within this type of connector to seal the area surrounding the terminal to ensure that all voids are filled to prevent sparking amongst terminals. The need has arisen for aircraft connectors to withstand and electrically handle voltages up to and including 8 kilovolts without sparking between the terminals thereby degrading or destroying the electrical terminals.

One breakaway connector is shown in U.S. Patent 4,684,192 which includes an aircraft connector which is connectable to the base of the aircraft and a helmet connector half which is provided with the pilot's helmet. Although U.S. Patent 4,684,192 indicates that the connector is for use with signal and power contacts, the connector could not be used with voltages as high as 8 kilovolts as the connector does not include any sealing surrounding the electrical terminals.

In an effort to solve the above mentioned problem the present invention consists in an electrical connector as defined in claim 1.

According to an embodiment of the invention the insert means is further profiled so as partially to extend from the front face of the housing means, and the insert means further comprises a through bore which extends between a front and rear end of the insert means. The at least one electrical terminal disposed within the through bore of the insert means includes means to retain the terminal within the insert means. The aircraft connector also includes sealing means surrounding the portion of the insert means which extends from the front face of the housing means, proximate the front end of the insert means. When the aircraft connector and the pilot's connector are mated, the insert means are disposed within the aperture of the pilot's connector to seal the voids around the terminal preventing sparking between the high voltage terminal and any adjacent terminals, whether power or data.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is an isometric view of a connector according to an embodiment of the invention.

Figure 2 is an isometric view of the connector of Figure 1 showing the components exploded.

Figure 3 is an isometric view of the metallic shell of the connector of said embodiment.

Figure 4 is a cross-sectional view through lines 4-4 of Figure 3.

Figure 5 is an isometric view of the forward insert of the connector of said embodiment.

Figure 6 is a cross-sectional view through lines 606 of Figure 5.

Figure 7 is an isometric view of the rear insert of the connector of said embodiment.

Figure 8 is a cross-sectional view through the center of the high voltage insert of the connector of said embodiment.

Figure 9 is an isometric view of a swivel backshell of the connector shown in Figure 1.

Figure 10 is the swivel block which is used in the connector of the present embodiment.

Figure 11A is an isometric view of the data terminals and retention clips used in the connectors described herein.

Figure 11B is an isometric view of the coaxial terminals used in the connectors described herein.

Figure 11C is an isometric view of the high voltage terminals used in the connector of said embodiment.

Figure 12 is an isometric view of the mating connector which is electrically connectable with the connector of Figure 1.

Figure 13 is an isometric view of the mating connector of Figure 12 showing the components in an exploded manner.

Figure 14 is an isometric view of the forward insert of the connector of Figure 12.

Figure 15A is an isometric view of the rear insert of the connector of Figure 12.

Figure 15B is a cross-sectional view through the inserts of Figures 14 and 15A.

Figures 16 and 16A are cross-sectional views taken through the center of the connector of said embodiment and through the center of the connector shown in Figure 12.

Figure 17 is a cross-sectional view of Figure 16 in the fully mated position.

With reference to either of Figures 1 or 2, the connector of said embodiment generally includes a forward metallic shell 4 having inserted therein a forward insert 30 and a rear insert 60 having clipped between the two inserts 30 and 60, a plurality of removeable terminals (Figures 11A-11C). The connector further includes a swivel backshell 120 and two swivel blocks, such as 140. With reference now to Figures 3 and 4, the forward metallic shell will be described in greater detail.

The forward metallic shell 4 includes a forward shroud, such as 6, with a second bore 10 which is

of a smaller diameter than the forward shroud 6. The metallic shell 4 also includes a threaded end, such as 14, at the rearward end of the metallic shell. On the internal circumferential surface 10 is included a rib or a ring 12 which is integral with the shell and circumferentially surrounds the interior surface 10 and defines a forwardly and a rearwardly facing shoulder. Behind the rib 12 and in front of the threaded portion 14 is a snap ring groove, such as 22, the purpose of which will be described in detail subsequently. The connector includes a latching structure which comprises integral blocks 16 on diametrically opposed sides of the metal shell 4 and includes a pin 20 and roller 21 which are disposed between the blocks which disposes a portion of the roller 21 in a window 18, projecting a portion of the roller 21 into the internal structure of the metal block, beyond or inside of the inner circumference of the metallic shell for latching to a matable connector.

With reference now to Figure 5, the forward insert 30 includes a forward barrel portion 32 for receipt of the plurality of terminals and includes three aperture sizes, such as apertures 36, 44, and 50. At the rear of the insert 30 is a shoulder, such as 34. With reference to Figure 6, apertures 36 include a forward bore such as 42, an internal rib, such as 38, which defines a forwardly and rearwardly facing shoulder, and a larger bore at the rear which is shown generally as 40. Aperture 44 similarly includes a rib, such as 46, however the bore 48 on either side of the rib 46 has the same diameter. Aperture 50 includes a constant bore throughout.

With reference now to Figure 7, rear insert 60 is shown as including apertures 66 which are alignable with apertures 36 in the forward insert, with the bore size of the aperture 66 being smaller than the rear bore 40 of aperture 36. Apertures 70 are alignable with apertures 44 in the forward insert, with the diameter of the bores 70 being the same as the diameter of the bore 48. The apertures 78 are alignable with the apertures 50 in the forward insert 30, and an oblong recess, such as 74, surrounds the apertures 78 thereby defining a forward face 76. It should be noted from Figures 6 and 7 that the inserts 30 and 60 include complementary polarizing lugs 47 and polarizing apertures 79, which are different in size to ensure that the insert 60 is placed against the insert 30 with the recess 74 facing the rear face of the insert 30, and to ensure that the insert 60 is properly oriented radially. Although only one polarizing lug 47 is shown in Figure 6, it should be understood that a second lug is located in a diametrically opposed position relative to the lug that is shown.

With reference now to Figure 8, the high voltage insert 90 is shown as including an aperture extending between the forward and rearward end generally defined by the numeral 92 which includes a first bore 94 which is continuous with a second bore 96 which defines a tapered lead-in 102 between the two bores 94 and 96. Aperture 92 further includes a forward bore 100 which defines a shoulder 98 between the two bores 96 and 100. The high voltage insert further includes two O-ring grooves 106 and 108 which are generally poised at the forward end of the insert 90. The high voltage insert 90 further includes a locking ring, such as 104, which is integrally molded with the insert and extends circumferentially around the insert.

Figure 9 shows the swivel backshell as generally including a threaded cap 122 having external threads which are complementary with the threaded end 14 of the metal shell 4, as shown in Figure 4. The swivel backshell further includes a swivel ball 124 having a V-groove 126 which surrounds the ball about its center. The swivel backshell further includes a rear cable clamp, such as 128, which defines a cable strain relief when a complementary clamp half 129 (Figure 2) is installed onto the clamp block 128. A cable receiving through hole 130 extends through the swivel backshell for the receipt of the data and power cable therethrough.

With reference to Figure 10, the swivel block 140 generally includes a flange 142 which is used for mounting the connector. The interior portion of the block 140 includes a complementary profiled surface 143 for surrounding the ball 124 of the swivel backshell 120. The swivel block 140 further includes a surface, such as 144, which circumferentially surrounds V-groove 126 of the swivel backshell 120. It should be understood that when in use, two such swivel blocks 140 are used which are shell halves which interlockingly mate by means of alignment pins 147 and grooves 149.

With reference now to Figures 11A-11C, the terminals are shown which comprise the electrical connections, and include pins 160 and sockets 320 for the transmission of data signals, (Figure 11A); coaxial pins and sockets 190 and 330 for data transmission, (Figure 11B); and high voltage pins and sockets 310 and 220, (Figure 11C). Reference to Figure 11A shows that the pin 160 comprises a pin portion 164, a crimpable portion 166 and a band portion 162 which is of a greater diameter than the crimpable portion thereby forming a forwardly and a rearwardly facing shoulder. Retention clip 170 is also shown as including a cylindrical portion 172 including integral retention fingers 174 which extend inwardly towards the center of the clip. Figure 11A also shows a socket 320 which is identical to socket 220, which will be described herein; and a retention clip 328, identical to clip 170.

With reference now to Figure 11B, coaxial pin 190 is shown as including an outer conductive housing including a forward shroud,portion 200, a central constricted portion 196, a bulged or contracted portion 198, and a rear end portion 202. A retention clip 206, having fingers 208, is snapped into and around the constricted portion 196. Reference to Figure 16 shows that the interior of the coaxial terminal 190 includes a pin section 192, having a crimpable portion 194, the pin portion 192 and the crimpable portion 194 being insulated from the exterior housing member. Similarly, the coaxial socket 330 includes an outer conductive housing which includes a forward conductive shell 332, a constricted portion 334, a bulged portion 336, and an end portion 338. Coaxial socket 330 further includes an identical retention clip as retention clip 206. As shown in Figure 16, the interior of the coaxial socket includes a tube 339 which is crimpable onto the center conductor of a coaxial lead at the rear end and which is matable with the coaxial pin 192 at its opposite end.

Reference now to Figure 11C shows the high voltage assembly as including the insert 90, a socket 220, a retention clip 112 and a retention collar 110. Socket 220 is identical to socket 320 and includes a crimpable portion 222, a socket portion 224, and a central band portion 226. The interior of the collar (Figure 16A) includes a shoulder 113 which is smaller than the circular portion 111 of the retention clip 112. Pin 310 is identical to pin 160 which was described above.

In order to assemble the connector, the cable is first inserted through the opening 130 in the swivel block, and then the individual conductors are terminated to their respective terminals. For example, the data conductors 236 can be terminated to the crimpable portions 166 of the terminals 160 (Figure 11A); the coaxial conductors 234 are terminated to the crimpable portions 194 (Figure 16); and the high voltage terminals are prepared by placing the conductor of the cables 238 within the crimpable ends 222 and the conductors crimped in place.

To retain the terminals 160 within their respective apertures, the connector housing is preassembled by placing the forward insert 30 within the metallic shell 4, placing the retaining clips within the apertures 40, and then assembling the rear insert 60 in place within the metallic shell 4, and locked in place within the shell 4 via the snap ring 230. The retention clips 170 remain within the apertures 40 as the diameters of the apertures 66 in the rear insert 60 are smaller than the diameters of the retention clips 170. At the same time the retention clips 170 are sandwiched between the forward 30 and rear 60 inserts, the high voltage inserts 60 are sandwiched between the inserts 30 and 60 also. The terminals 160 are then insertable through the respective apertures 60 and 40, and snapped into the position shown in Figure 16.

The high voltage terminals 220 are retained within the high voltage inserts 90 via the retention clips 112 and the collars, and the retention clips 112 and the collars can either be preassembled within the high voltage inserts 90 prior to the assembly of the inserts 90 between the inserts 30, 60, or can advantageously be assembled after their assembly. In either event, the retention clip 112 and the retention collar 110 are slid forwardly into the high voltage inserts 90 until the front ends of the collars 110 abut the shoulders 98 within the high voltage inserts 90 (Figures 8 and 16A). The collars 110 are frictionally fit within the bores 96 and a tool (not shown) can include a split seam which is receivable over the conductors 238 to apply a force to the rear of the collars 110, which in turn carries the retention clips into the inserts 90. The terminals are then insertable from the rear of the connector and are spring clipped in place, as shown in Figure 16A.

The coaxial pins 190 are retained within their respective apertures by means of retainers 206 which are snapped over the diameter of the coaxial pins 190. The coaxial pins 190 and their retainers 206 are receivable into the assembled inserts 30, 60 to the retained position shown in Figure 16.

As mentioned earlier, a snap ring 230 is placed in the shell 4 within the groove 22 which retains the two inserts 30, 60 in place. It is preferred that the rear of the insert 90 be potted with an appropriate sealing compound to prevent discharge/sparking from the rear of the high voltage terminals. To complete the assembly, the swivel backshell 120 is threaded to the rear of the shell 4 and the two swivel blocks 140 are attached in a surrounding relation with the swivel ball 124. The connector 2 can then be mounted to the base of an aircraft for use with a connector attached to a pilot's helmet.

With reference now to Figures 12 and 13, the mating connector 250 generally includes a metallic outer housing 252, and inner insulative inserts 340 and 360. The mating connector 250 further comprises a rear metallic housing portion 390 and a strain relief gland 410 and nut 420. Reference to Figure 12 alone shows that the mating connector 250 includes a polarizing bar 302 which is complementary with the notch 8 in the outer shell 4, and further includes detents 304 which are complementary with the pins 20 in the outer housing 4. Also as shown in Figure 12, the connector 250 includes associated apertures 306 for receipt of the high voltage inserts while the contacts 320 and 330 extend forwardly from the front face of the insert 340 for insertion into the respective apertures within the connector 2.

Reference to Figure 14 shows that the forward insert includes a front mating face 344 having a plurality of apertures extending through the mating face 344 to the rear face. There are two aperture sizes, 346 and 348, and an oblong recess 350 is further included. The forward insert 340 also includes a forwardly facing shoulder 342.

With reference to Figure 15A, the rear insert 360 includes a front mating face having apertures 374 and 376 extending inwardly from the front mating face and further comprises a pillar 364 which extends outwardly from the front mating face. Pillar 364 includes three apertures 378 which are shown in Figure 15B as including two bores 380 and 382. Figure 15B also shows that the inner portion of the pillar 364 includes a cavity 384 and a through aperture 386 for the pins.

A virtually identical assembly process is used to assemble the mating connector 250 as in the connector 2 in that mating terminals are used in the mating connector 250 as in the connector 2. After inserting the cable 430 through the nut 420, gland 410 and through the backshell 390, the terminals are installed as in the connector 2, and the forward insert 340 and rear insert 360 are locked in place within the conductive shell member 252 via a snap ring 388. The rear shell portion 390 can then be threadably engaged to the forward conductive shell 252 and the strain relief nut 420 can then be driven forward which expands the gland 410, acting as a strain relief for axial tension on the cable 430. It should be noted that other means are available to retain the two outer housing components 252, 390 together, which would not include the threads 392. For example, the two components could merely be abutted one to the other and held in place by fasteners such as grub screws. Alternatively, the two components could include complementary latching means such as pins 20 (Figure 3) and detents 304 (Figure 12).

As mentioned previously, high altitudes cause atmospheric conditions to approach those of a vacuum, causing relatively low level voltages to jump gaps between adjacent metallic components, which could be adjacent data or power terminals. If an adjacent terminal receives a spark from a power terminal, this sparking could damage the equipment which is connected to the adjacent terminal or it could cause phantom signals which lead to inaccurate data transmission. The above described connector solves the previously described problems as the connector includes sealing surrounding the terminals which prevents sparking between gaps within the connector. To further prevent voids around the terminals, the high voltage terminals are installed within inserts which are allowed to radially move relative to their axial length. The inserts also include O-rings 114 around the ends of the inserts.

As the connector 2 mates with the connector 300, as shown in Figure 17, the forward ends of the inserts 90 are disposed within the apertures 306 of the connector 300. To ensure that the aperture is adequately sealed the inserts are moveable to align the inserts squarely with the apertures 306. Said differently, if the inserts were fixed from movement, the inserts 90 could be slightly misaligned with the apertures 306, which would cause the seals or O-rings 114 to be heavily loaded on one side while possibly allowing either a finite gap or only slight compression on the opposite side which would enhance the break down of the O-ring 114 in that area by the high voltage. Thus by allowing the insert 90 to "float", the O-rings 114 are properly centered relative to the apertures 306, thereby allowing the O-rings 114 to receive uniform deformation or crush around their periphery. It has been found that an adequate material for the O-rings is silicone rubber which has been tested in the above-described assembly with a breakdown voltage of 12 kilovolts.

It has been found that the performance of the connector is not dependent upon the material used in the inserts 30, 60 as these inserts are not subjected to high voltage. Either an epoxy molding compound or a glass filled PBT could be used with similar results.

The optimum material for the high voltage inserts has been found to be a liquid crystal polymer, although an acetate is also acceptable and provides for increased machinability.

Claims

1. An electrical connector (2) for use at high altitudes with power and data transmission, the electrical connector (2) comprising an insulative housing means (30, 60) having at least one electrical terminal (220) disposed within the housing means (30, 60) between a front and rear face,

   the housing means (30, 60) including an aperture (50, 78) extending therethrough profiled for receipt of an insert means (90), the insert means (90) being disposed within the said aperture (50, 78) of the insulative housing means (30, 60), the electrical terminal (220) being received within a bore (94, 96) of the insert means (90), the connector (2) being characterized in that the insert means (90) is profiled relative to the aperture (50, 78) so as to be radially moveable in order to align the insert means (90) with an opening (306) of a matable connector (250).

2. The connector of claim 1 characterized in that the insert means (90) is profiled so as to be

partially extending from the front face of the housing means (30), and further comprising a through bore (92) which extends between a front and rear end of the insert means (90).

3. The connector of any of the preceding claims characterized in that the through bore (92) of the insert means (90) includes means (110, 112) to retain the terminal (220) within the insert means (90).

4. The connector (2) of any of the preceding claims characterized in that the insert means (90) includes sealing means (114) surrounding the portion of the insert means (90) which extends from the front face of the housing means (30), proximate the front end of the insert means (90).

5. The electrical connector of any of the preceding claims characterized in that the insulative housing means (30, 60) comprises two housing members, a front (30) and a rear (60) member which cooperatively abut each other.

6. The electrical connector of any of the preceding claims characterized in that the insert means (90) includes an annular ring (104) therearound, and the front and rear housing members cooperatively form a recess (76) therein which traps the ring (104) of the insert means (90) within the recess (76).

7. The electrical connector (2) of any of the preceding claims characterized in that the recess (76) extends inwardly from a front face (62) of the rear housing member (60) to an extent to receive the ring (104) of the insert means (90).

8. The electrical connector (2) of any of claims 4-7 characterized in that the sealing means (114) includes at least one O-ring, and the front end of the insert includes grooves (106, 108) therein to receive the O-ring (114).

9. The electrical connector (2) of any of the preceding claims characterized in that the terminal (220) is a socket type terminal for the distribution of power and is matable with a pin type terminal (310) in the matable connector(250).

10. The connector assembly of claim 9 characterized in that the connector housing means (30, 60) includes a plurality of apertures (36, 44; 66, 79) for receiving a plurality of electrical terminals (160, 190) for the distribution of data signals.

Patentansprüche

1. Elektrischer Verbinder (2) zur Verwendung in großen Höhen für die Leistungs- und Daten-Übertragung, wobei der elektrische Verbinder (2) ein isolierendes Gehäuse (30, 60) aufweist, das wenigstens einen elektrischen Anschluß (220) hat, der innerhalb des Gehäuses (30, 60) zwischen einer vorderen und einer hinteren Fläche angeordnet ist,
wobei das Gehäuse (30, 60) eine sich durch dieses hindurch erstreckende Öffnung (50, 78) aufweist, die zur Aufnahme eines Einsatzes (90) profiliert ist, wobei der Einsatz (90) innerhalb der Öffnung (50, 78) des isolierenden Gehäuses (30, 60) angeordnet ist, wobei der elektrische Anschluß (220) innerhalb einer Bohrung (94, 96) des Einsatzes (90) aufgenommen ist, wobei der Verbinder (2) **dadurch gekennzeichnet** ist,
daß der Einsatz (90) relativ zu der Öffnung (50, 78) so profiliert ist, daß er radial beweglich ist, um den Einsatz (90) mit einer Öffnung (306) eines damit zusammenfügbaren Verbinders (250) auszurichten.

2. Verbinder nach Anspruch 1, **dadurch gekennzeichnet,** daß der Einsatz (90) so profiliert ist, daß er sich teilweise von der vorderen Fläche des Gehäuses (30) erstreckt und ferner eine Durchgangsbohrung (92) aufweist, die sich zwischen einem vorderen und einem hinteren Ende des Einsatzes (90) erstreckt.

3. Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** daß die Durchgangsbohrung (92) des Einsatzes (90) Mittel (110, 112) zum Halten des Anschlusses (220) innerhalb des Einsatzes (90) aufweist.

4. Verbinder (2) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** daß der Einsatz (90) Abdichtungsmittel (114) aufweist, die denjenigen Teil des Einsatzes (90) umgeben, der sich von der vorderen Fläche des Gehäuses (30) erstreckt, und zwar benachbart zu dem vorderen Ende des Einsatzes (90).

5. Elektrischer Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** daß das isolierende Gehäuse (30, 60) zwei Gehäuseglieder aufweist, ein vorderes (30) und ein hinteres (60) Glied, die zusammenwirkend aneinander anliegen.

6. Elektrischer Verbinder nach einem der vorhergehenden Ansprüche, **dadurch gekennzeich-**

net, daß der Einsatz (90) einen diesen umgebenden Ring (104) aufweist und daß die vorderen und hinteren Gehäuseglieder zusammenwirkend eine Ausnehmung (76) darin bilden, die den Ring (104) des Einsatzes (90) innerhalb der Ausnehmung (76) aufnimmt.

7. Elektrischer Verbinder (2) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** daß die Ausnehmung (76) sich von einer vorderen Fläche (62) des hinteren Gehäusegliedes (60) nach innen bis zu einem Betrag erstreckt, um den Ring (104) des Einsatzes (90) aufzunehmen.

8. Elektrischer Verbinder (2) nach einem der Ansprüche 4 bis 7, **dadurch gekennzeichnet,** daß die Abdichtungsmittel (114) wenigstens einen O-Ring aufweisen, und daß das vordere Ende des Einsatzes Nuten (106, 108) aufweist, um den O-Ring (114) aufzunehmen.

9. Elektrischer Verbinder (2) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** daß der Anschluß (220) ein Anschluß vom Buchsentyp für die Leistungsverteilung ist und mit einem Anschluß (310) vom Stifttyp in dem zusammenfügbaren Verbinder (250) zusammenfügbar ist.

10. Verbinderanordnung nach Anspruch 9, **dadurch gekennzeichnet,** daß das Verbindergehäuse (30, 60) eine Vielzahl von Öffnungen (36, 44; 66, 79) zur Aufnahme einer Vielzahl von elektrischen Anschlüssen (160, 190) für die Verteilung von Datensignalen aufweist.

Revendications

1. Connecteur électrique (2) à utiliser à de hautes altitudes pour la transmission de puissance et de données, le connecteur électrique (2) comportant des moyens de boîtier isolant (30, 60) à l'intérieur desquels est disposée au moins une borne électrique (220) entre une face avant et une face arrière des moyens de boîtiers (30, 60), les moyens de boîtiers (30, 60) étant traversés par une ouverture (50, 78) profilée pour recevoir un moyen rapporté (90), le moyen rapporté (90) étant disposé à l'intérieur de ladite ouverture (50, 78) du moyen de boîtier isolant (30, 60), la borne électrique (220) étant reçue à l'intérieur d'un alésage (94, 96) du moyen rapporté (90), le connecteur (2) étant caractérisé en ce que le moyen rapporté (90) est profilé par rapport à l'ouverture (50, 78) de façon à pouvoir être déplacé radialement pour aligner le moyen rapporté (90) avec une ouverture (306) d'un connecteur complémentaire (250).

2. Connecteur selon la revendication 1, caractérisé en ce que le moyen rapporté (90) est profilé de façon à faire saillie partiellement de la face avant du moyen de boîtier (30), et comportant en outre un alésage traversant (92) qui s'étend entre une extrémité avant et une extrémité arrière du moyen rapporté (90).

3. Connecteur selon l'une quelconque des revendications précédentes, caractérisé en ce que l'alésage traversant (92) du moyen rapporté (90) comporte des moyens (110, 112) destinés à retenir la borne (220) à l'intérieur du moyen rapporté (90).

4. Connecteur (2) selon l'une quelconque des revendications précédentes, caractérisé en ce que le moyen rapporté (90) comprend un moyen d'étanchéité (114) entourant la partie du moyen rapporté (90) qui fait saillie de la face avant du moyen de boîtier (30), à proximité de l'extrémité avant du moyen rapporté (90).

5. Connecteur électrique selon l'une quelconque des revendications précédentes, caractérisé en ce que le moyen de boîtier isolant (30, 60) comprend deux éléments de boîtier, un élément avant (30) et un élément arrière (60) qui coopèrent en butée l'un avec l'autre.

6. Connecteur électrique selon l'une quelconque des revendications précédentes, caractérisé en ce que le moyen rapporté (90) est entouré d'une bague annulaire (104), et les éléments de boîtiers avant et arrière forment ensemble un évidement (76) qui emprisonne intérieurement la bague (104) du moyen rapporté (90).

7. Connecteur électrique (2) selon l'une quelconque des revendications précédentes, caractérisé en ce que l'évidement (76) s'étend vers l'intérieur depuis une face avant (62) de l'élément de boîtier arrière (60) sur une étendue lui permettant de recevoir la bague (104) du moyen rapporté (90).

8. Connecteur électrique (2) selon l'une quelconque des revendications 4-7, caractérisé en ce que les moyens d'étanchéité (114) comprennent au moins une bague torique, et l'extrémité avant de l'élément rapporté présente des gorges (106, 108) destinées à recevoir la bague torique (114).

9. Connecteur électrique (2) selon l'une quelconque des revendications précédentes, caractérisé en ce que la borne (220) est une borne du type à douille pour la distribution de puissance et peut être accouplée avec une borne (310) du type à broche dans le connecteur complémentaire (250).

10. Ensemble à connecteurs selon la revendication 9, caractérisé en ce que les moyens de boîtiers du connecteur (30, 60) présentent plusieurs ouvertures (36, 44 ; 66, 79) destinées à recevoir plusieurs bornes électriques (160, 190) pour la distribution de signaux de données.

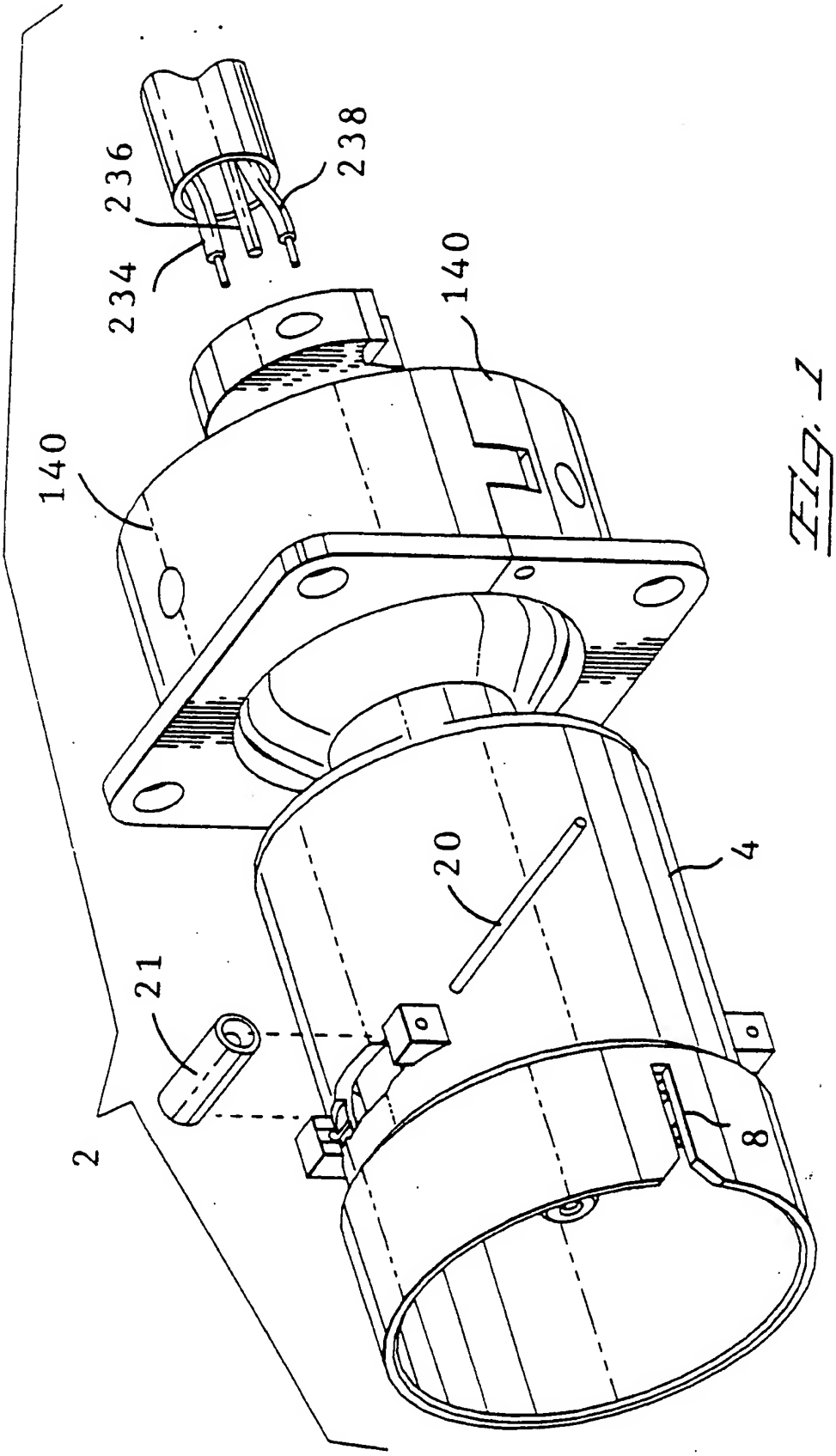

Fig. 1

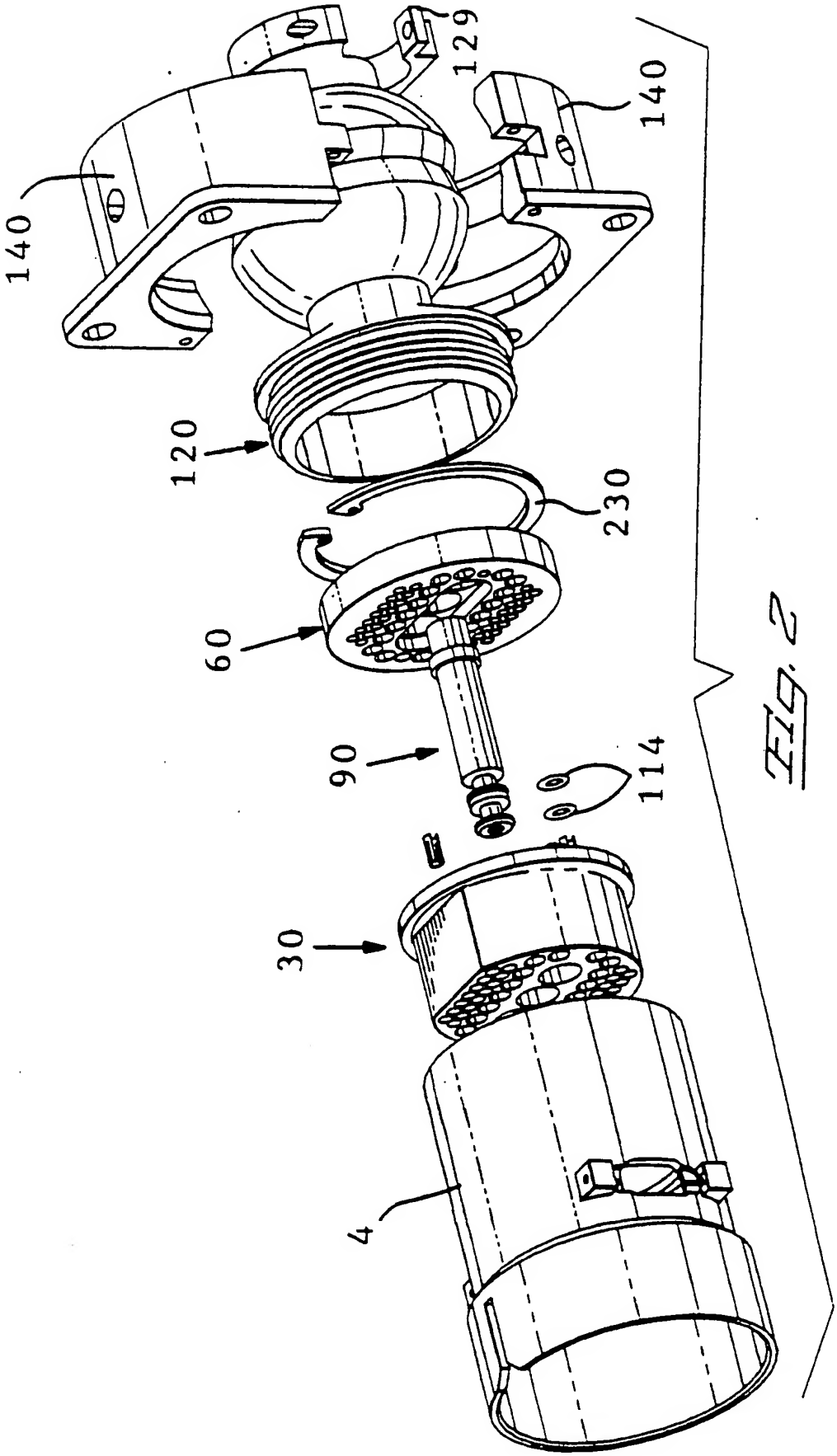

Fig. 2

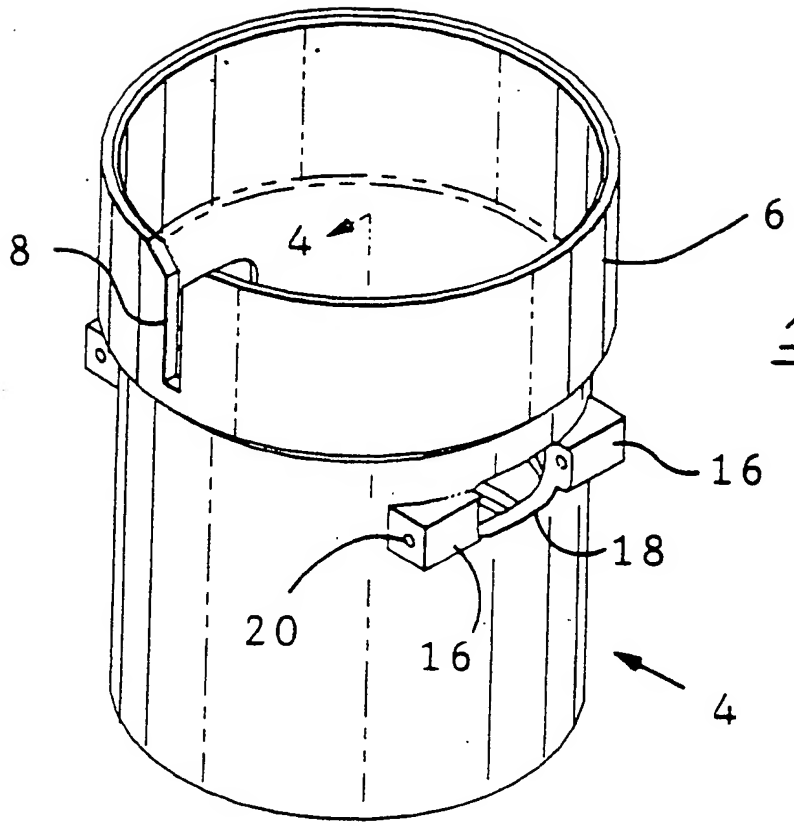

Fig. 3

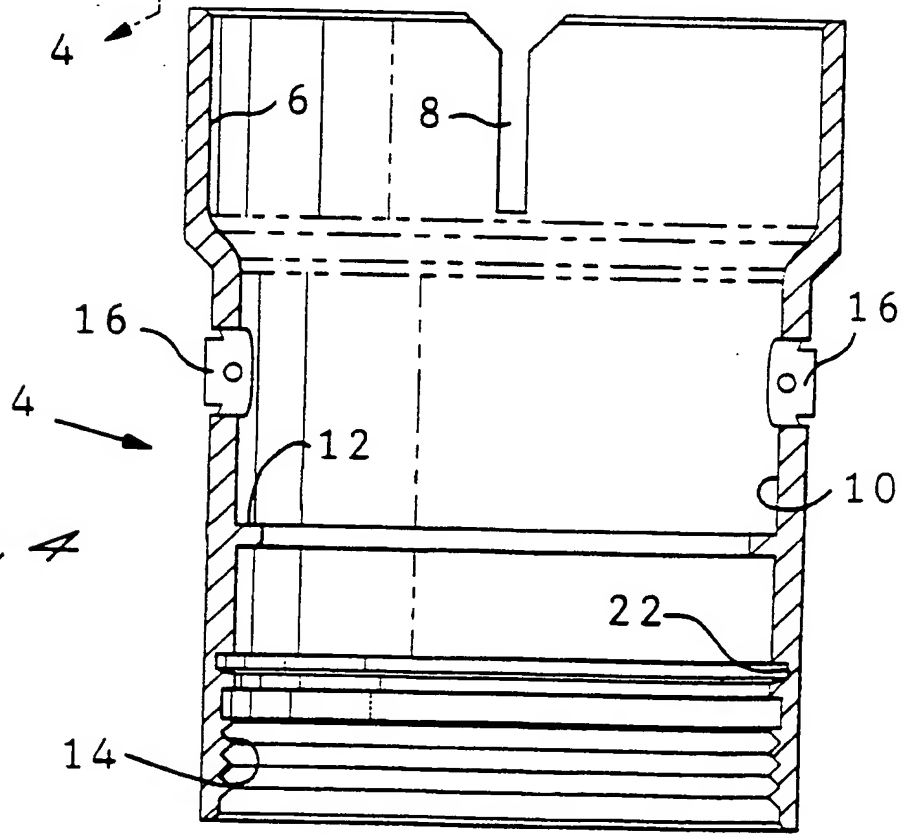

Fig. 4

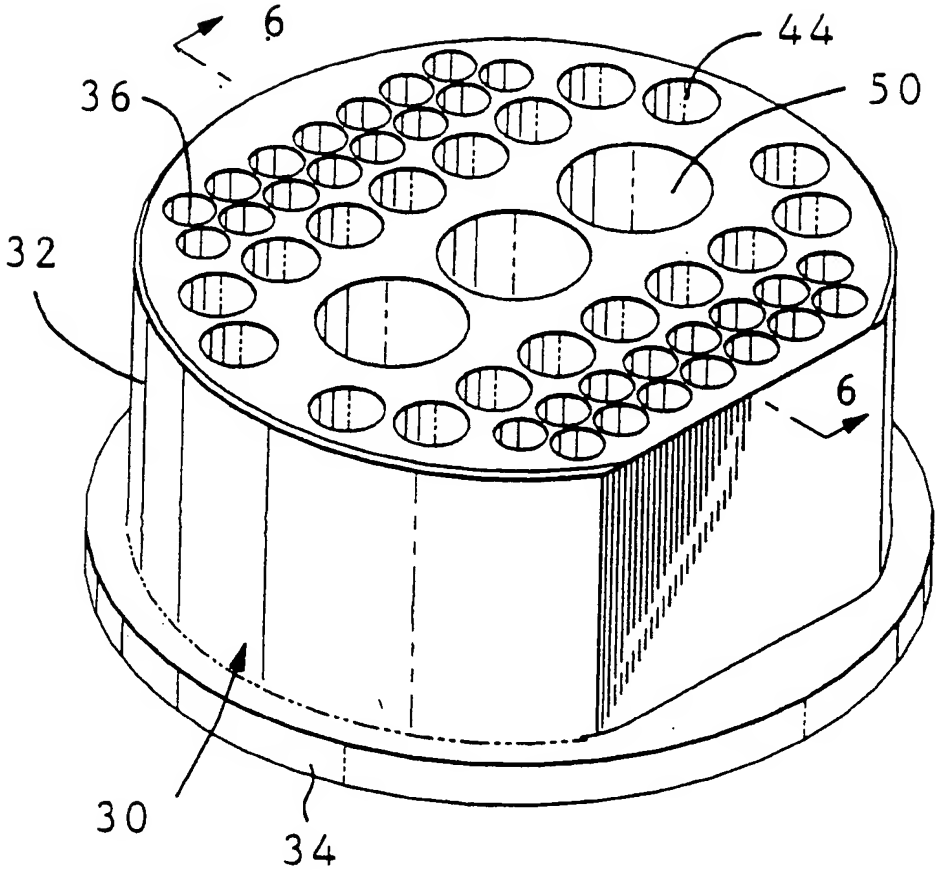

Fig. 5

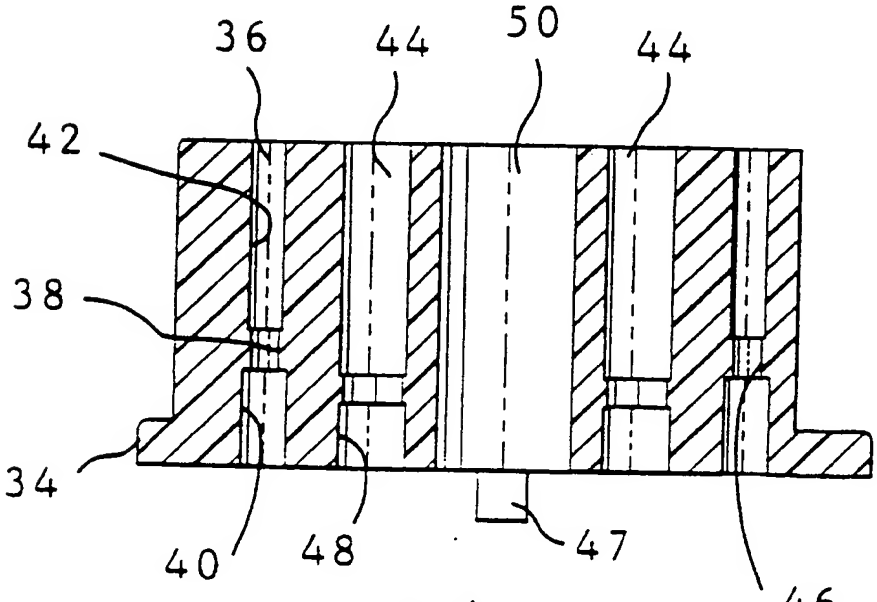

Fig. 6

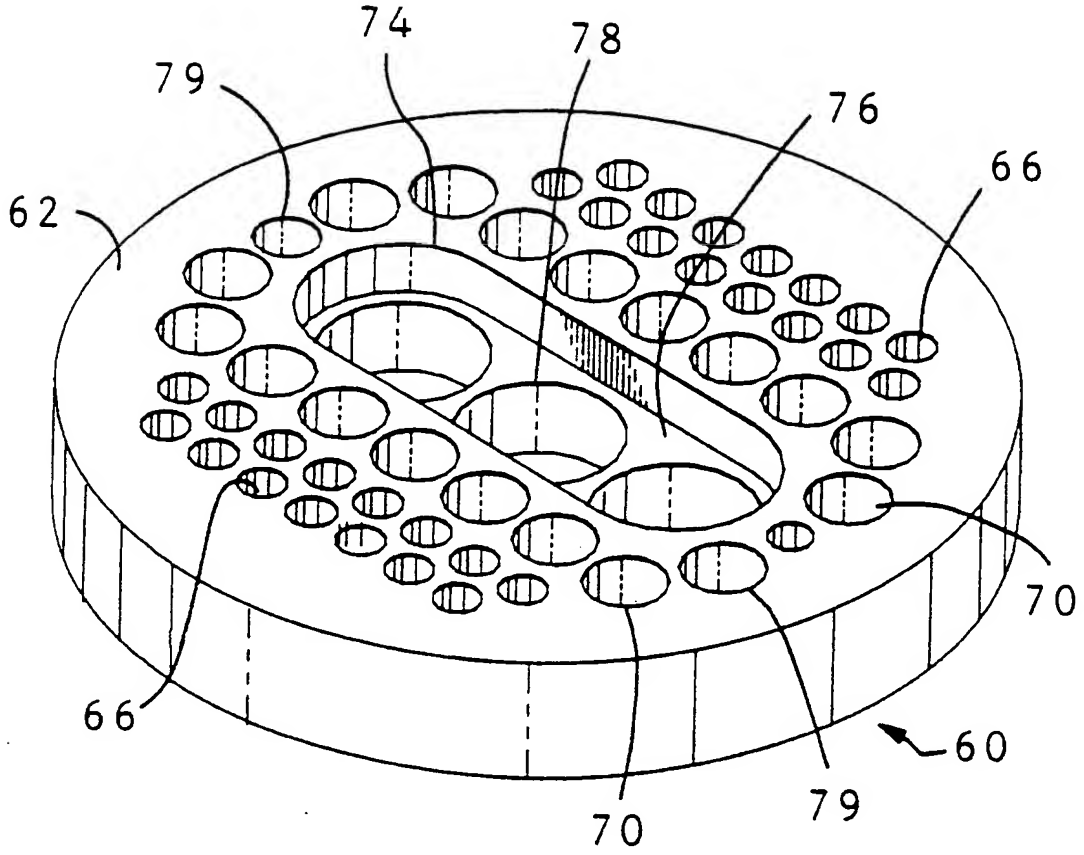

Fig. 7

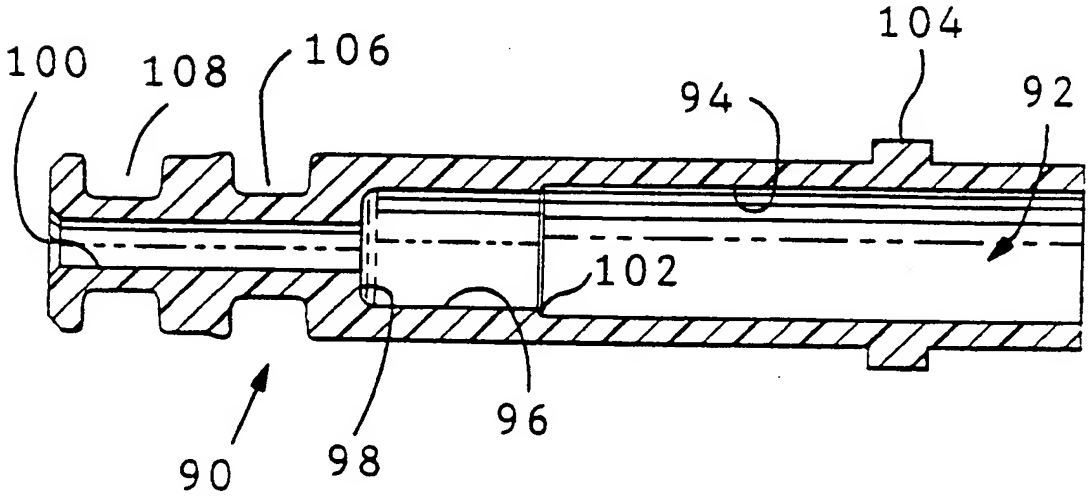

Fig. 8

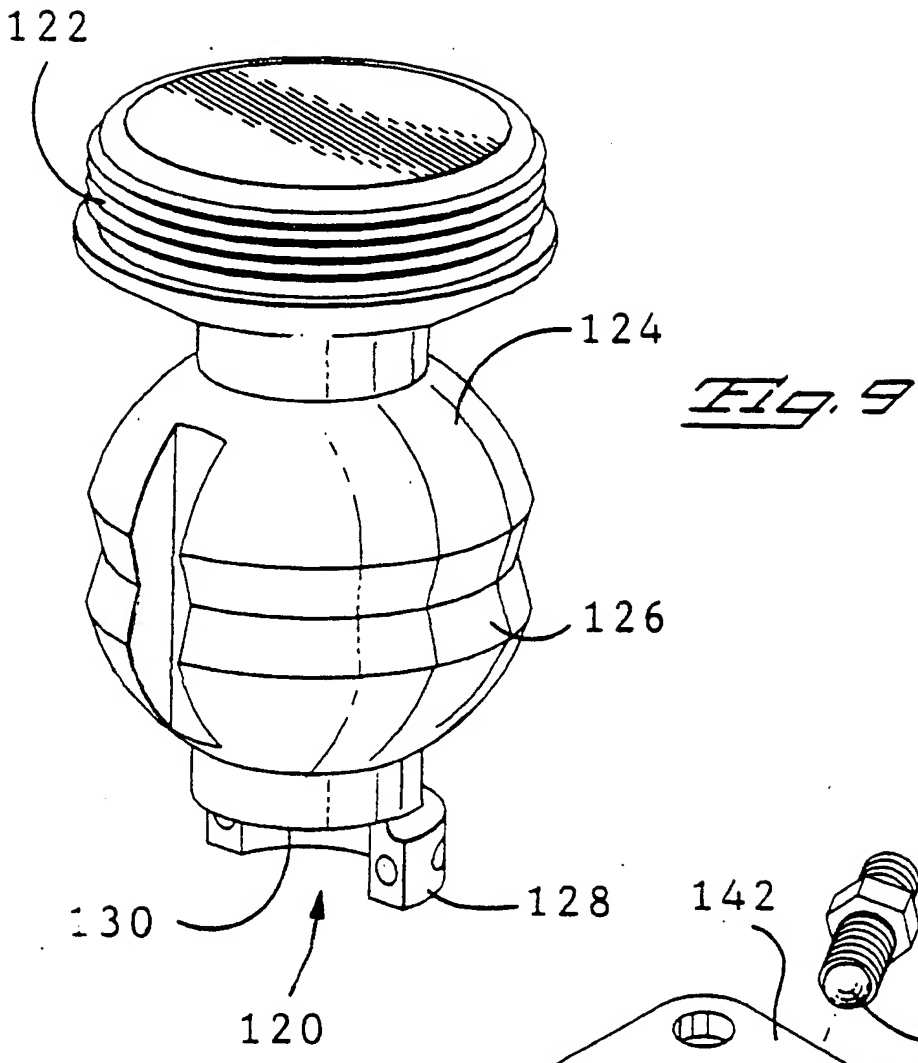

Fig. 9

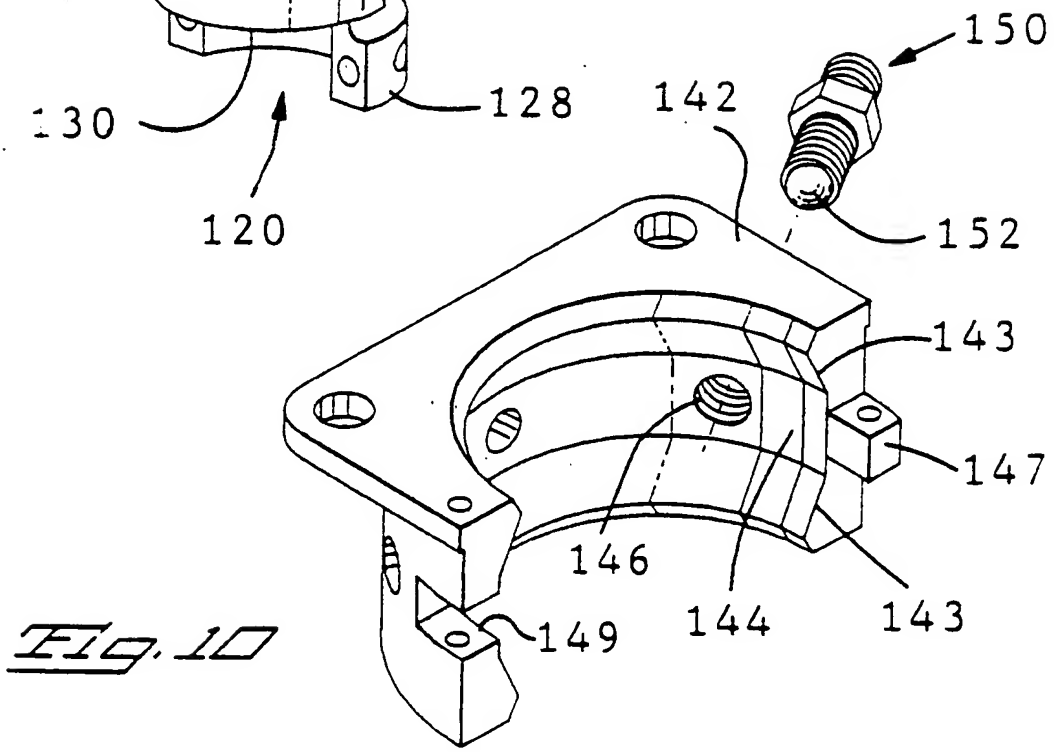

Fig. 10

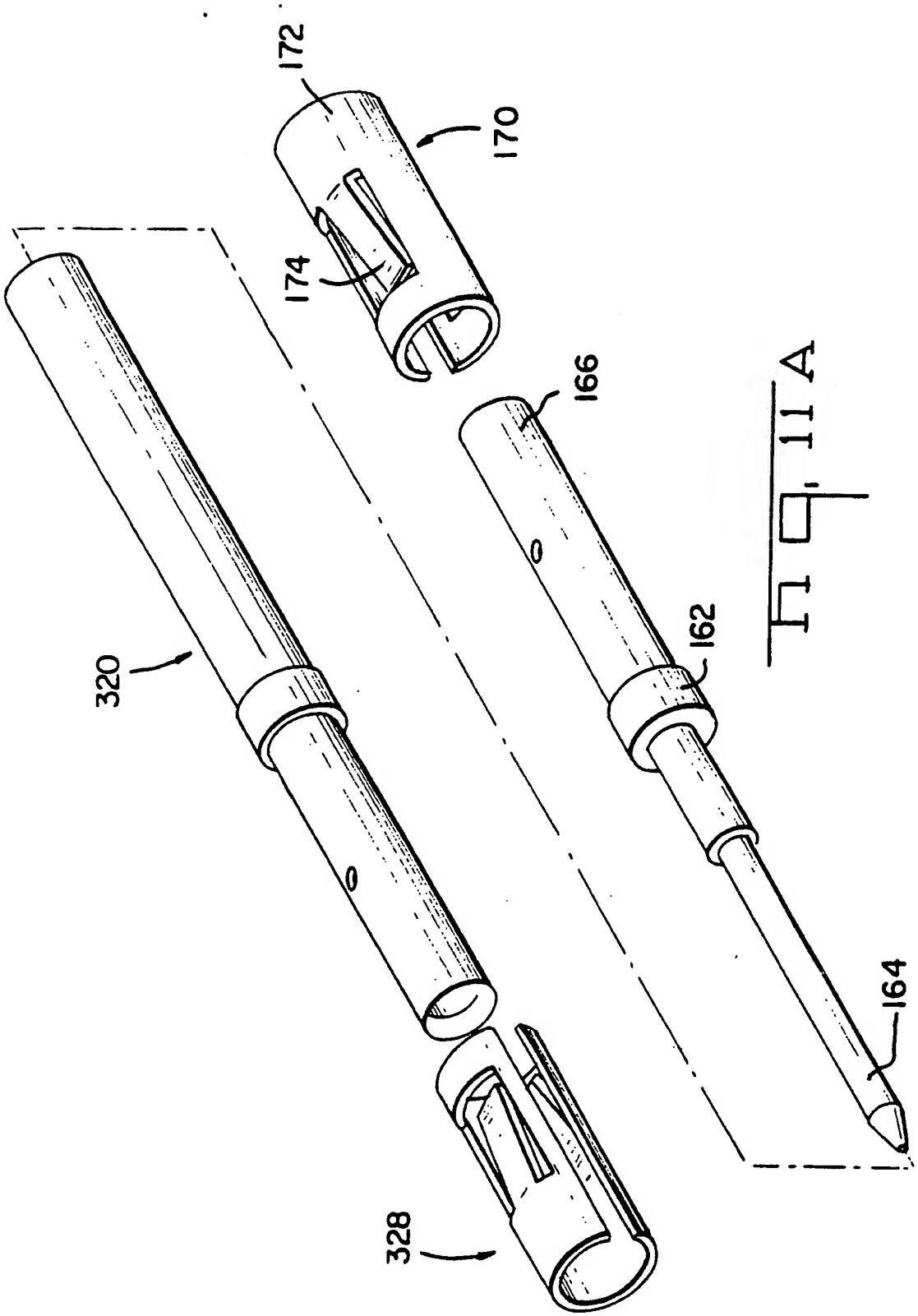

FIG. 11A

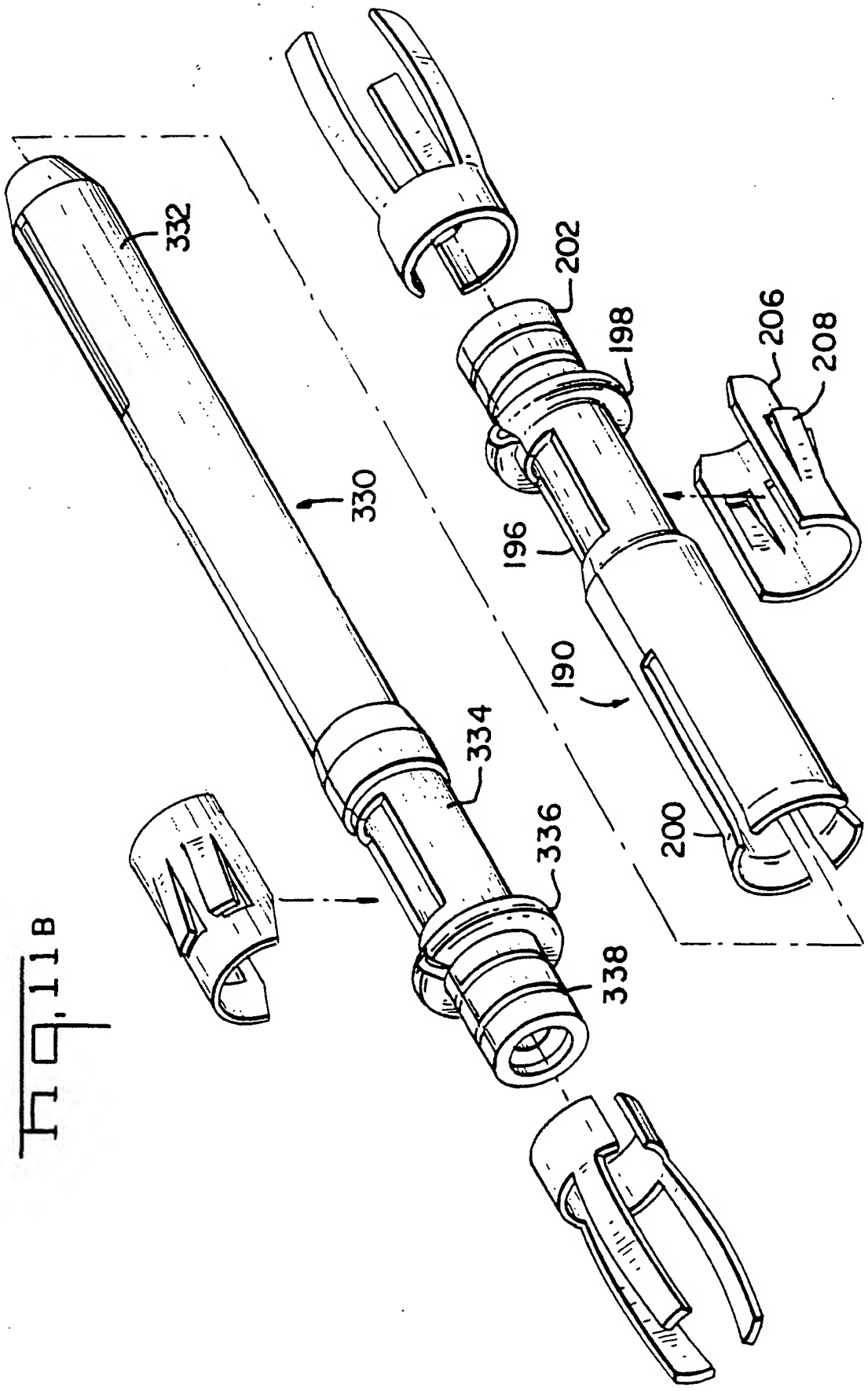

FIG. 11B

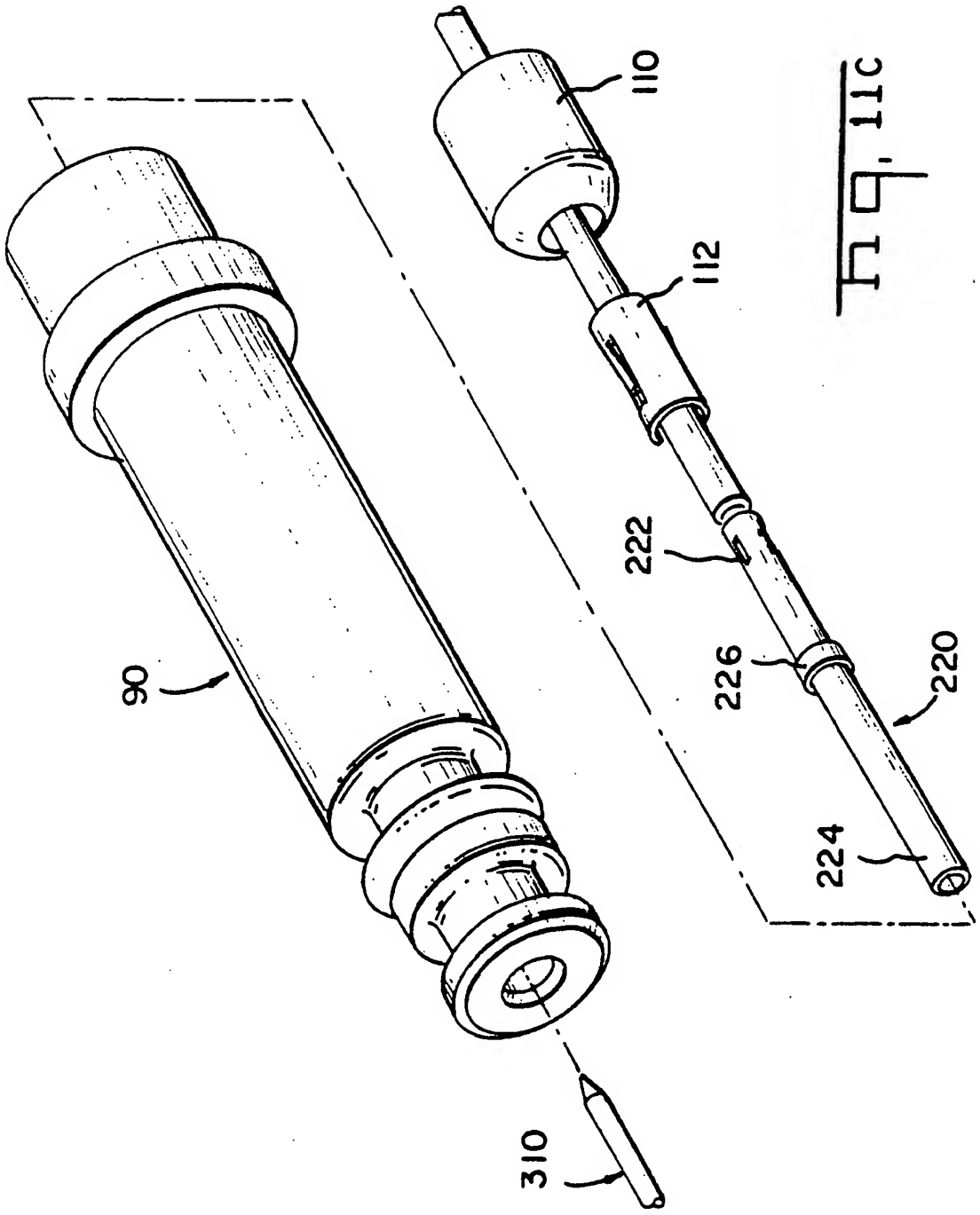

Fig. 11c

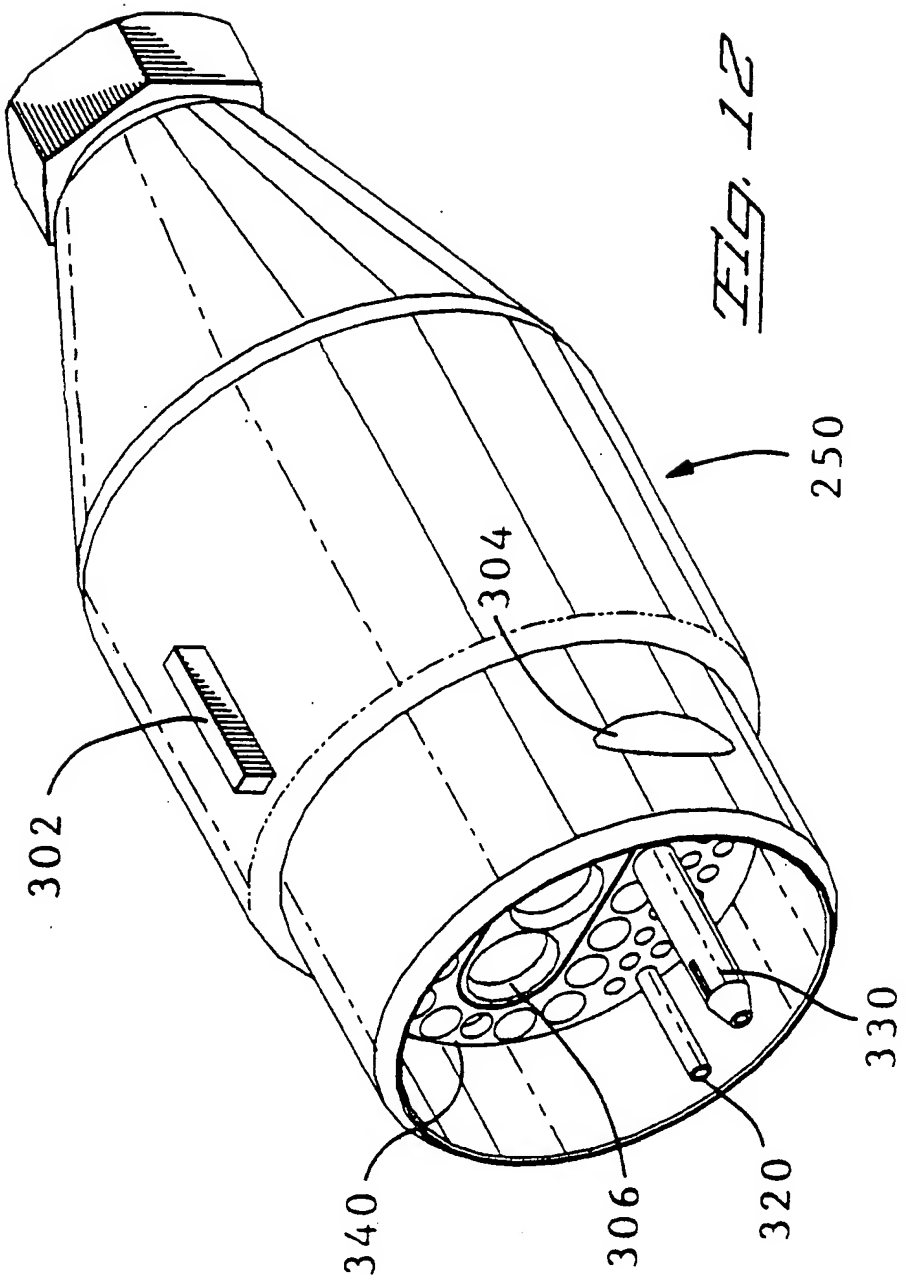

Fig. 12

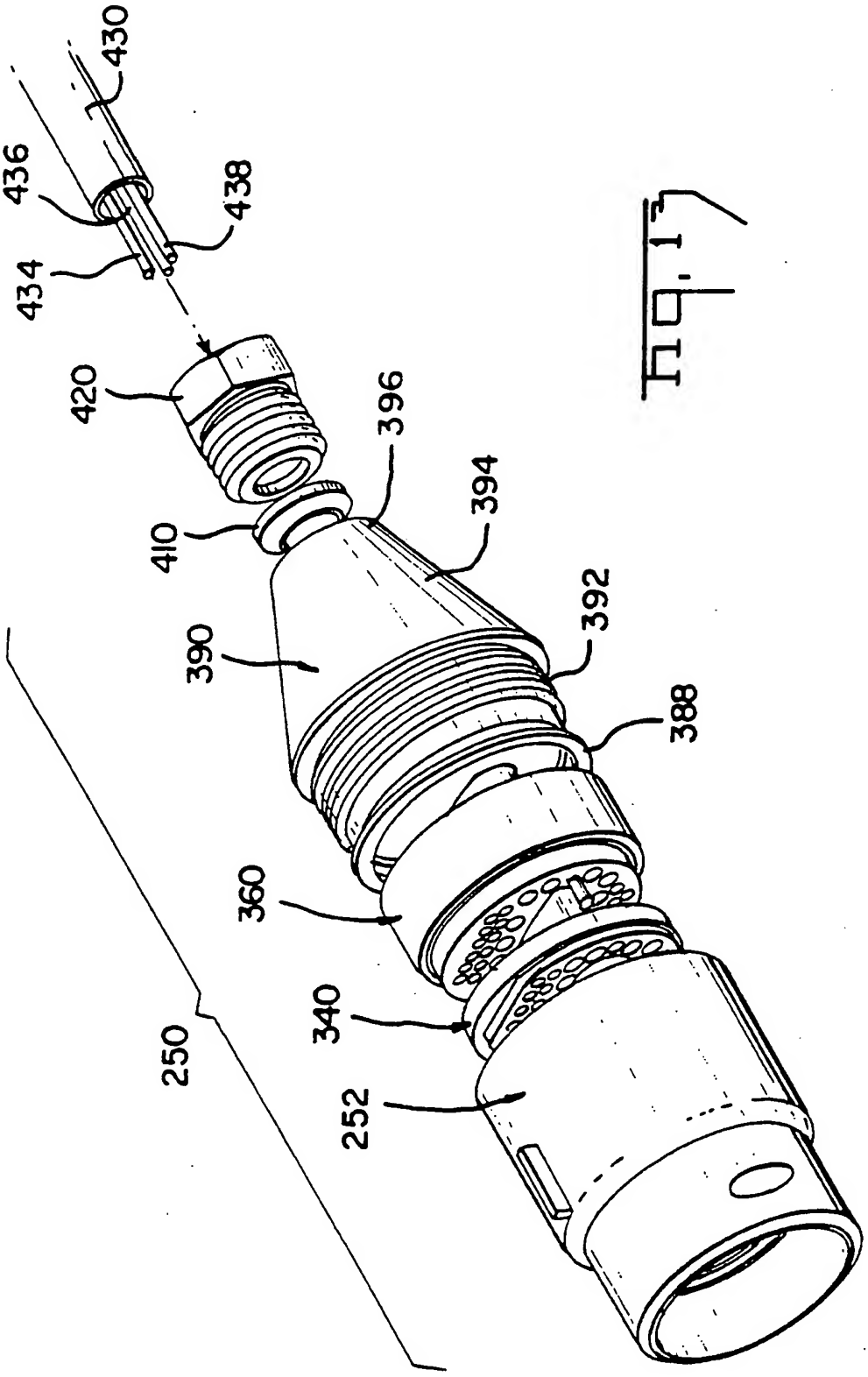

Fig. 1

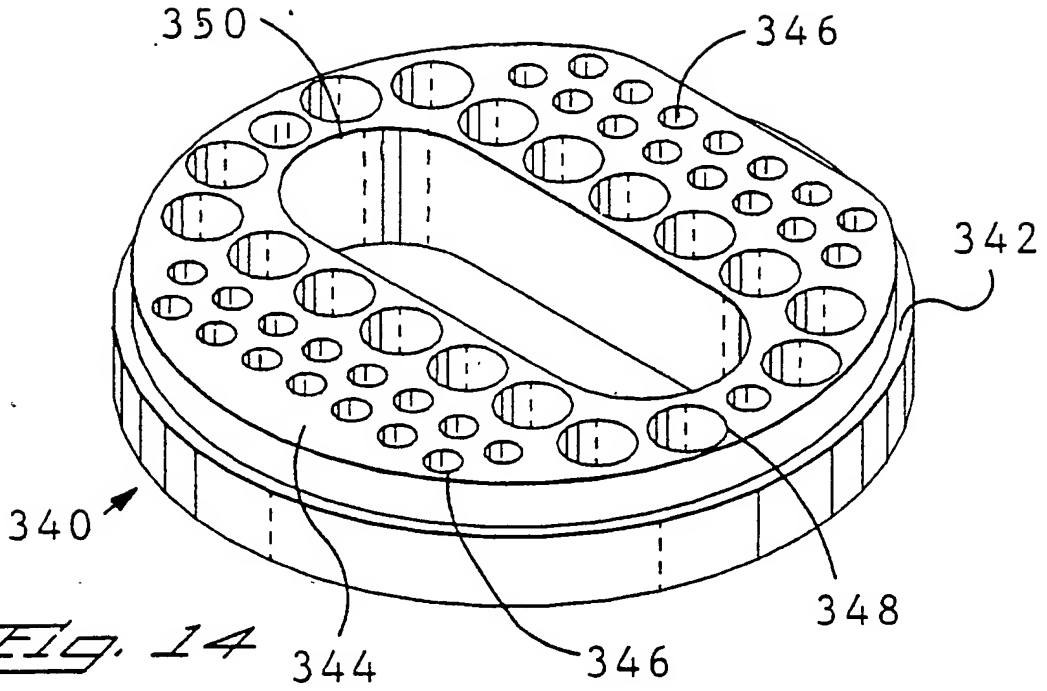

Fig. 14

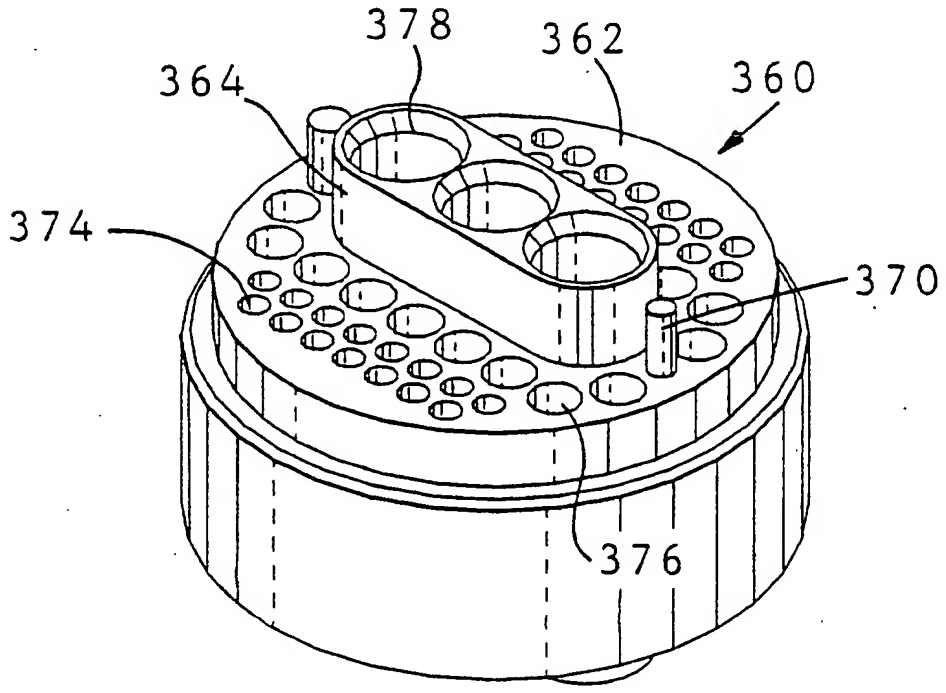

Fig. 15A

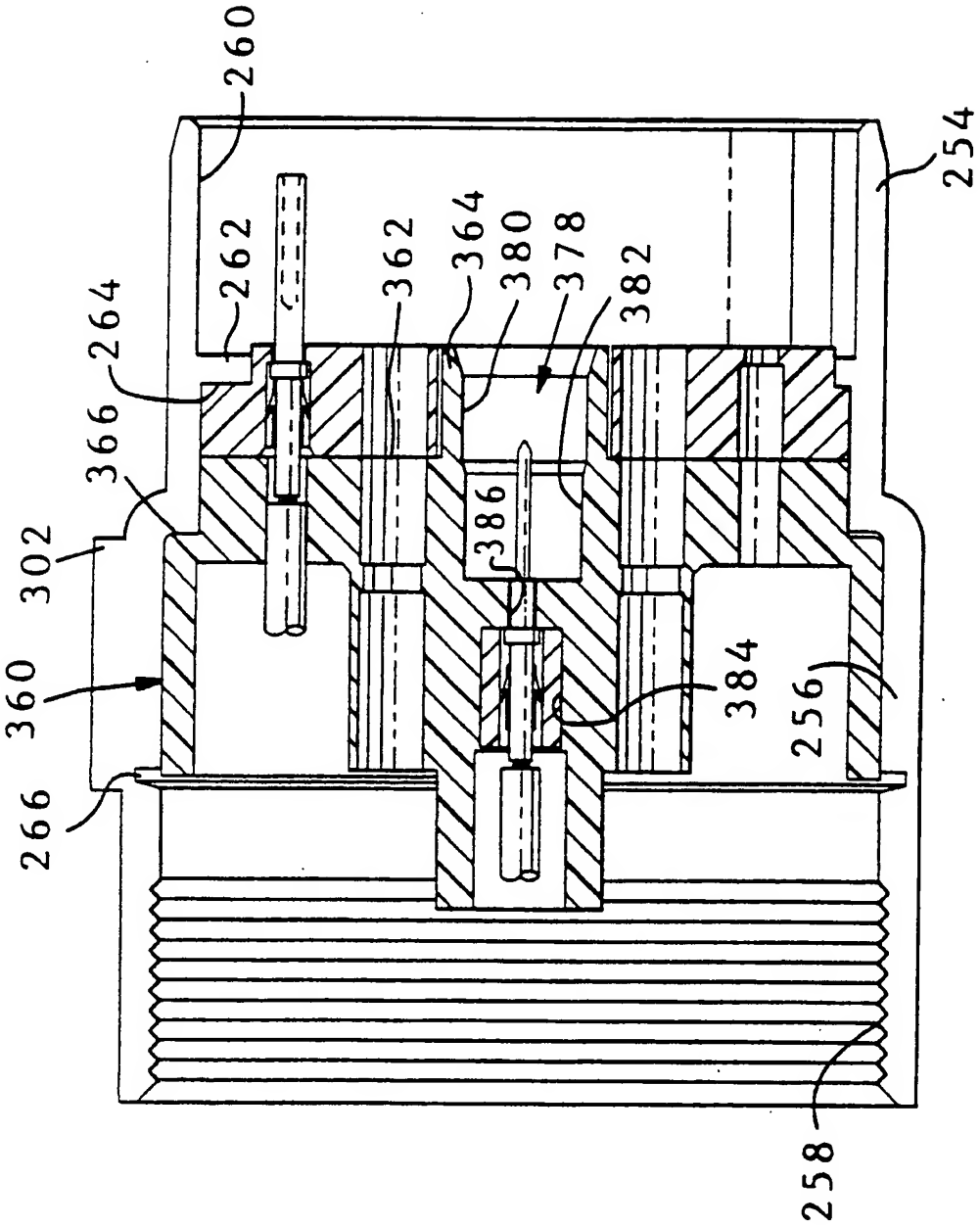
260
254
262
362
364
380
378
382
264
366
386
302
360
384
256
266
258

Fig. 15B

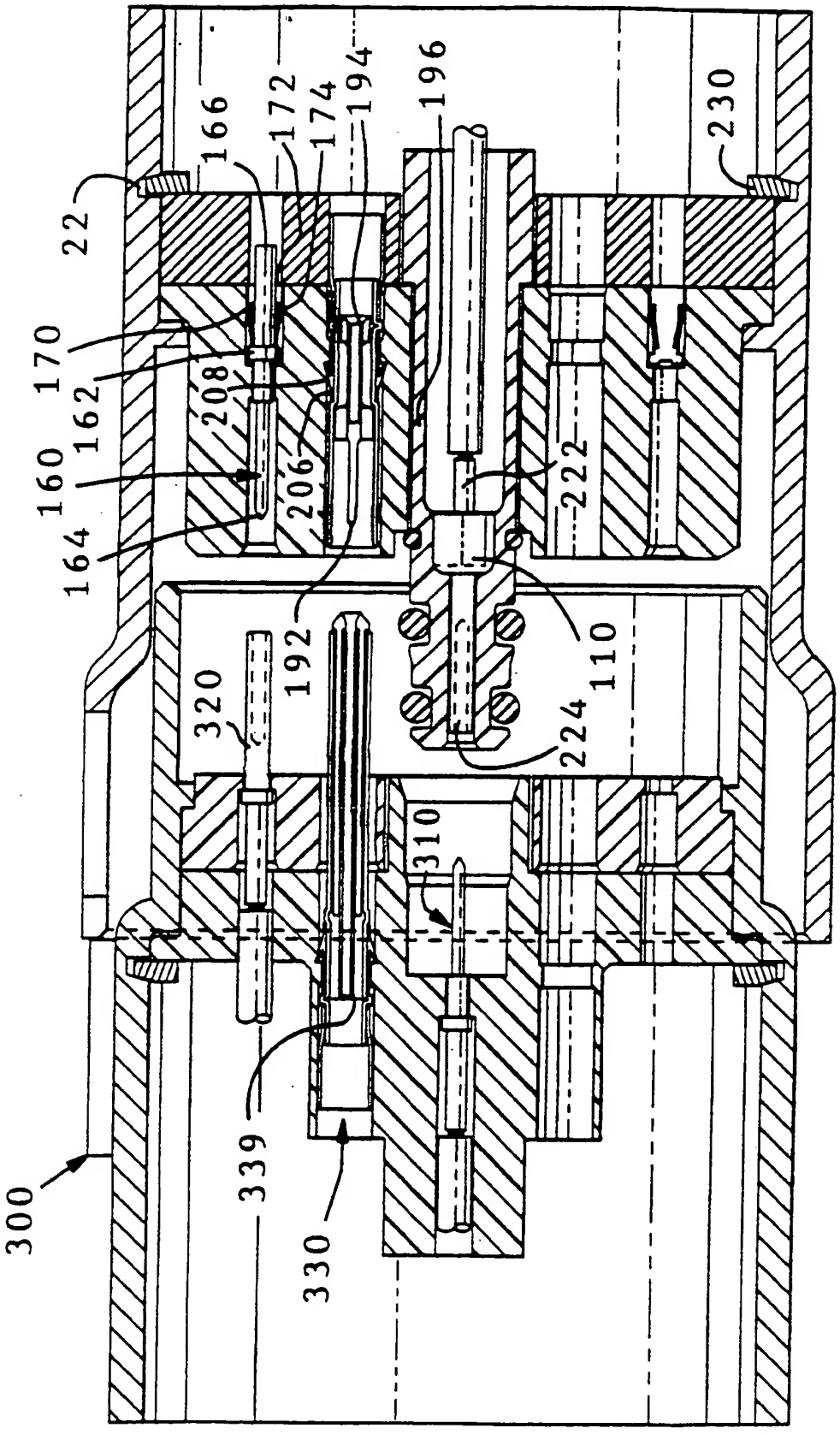
166
172
174
194
196
230
22
170
162
208
160
206
222
164
192
110
320
224
310
339
330
300

Fig. 16

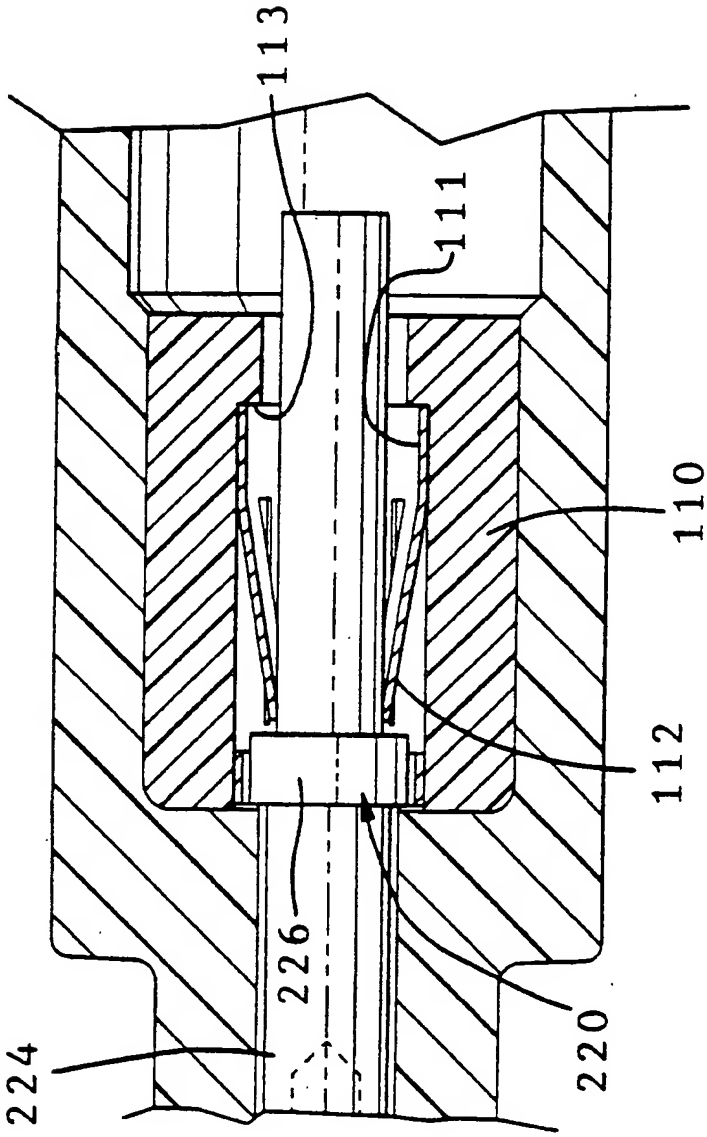

Fig. 16A

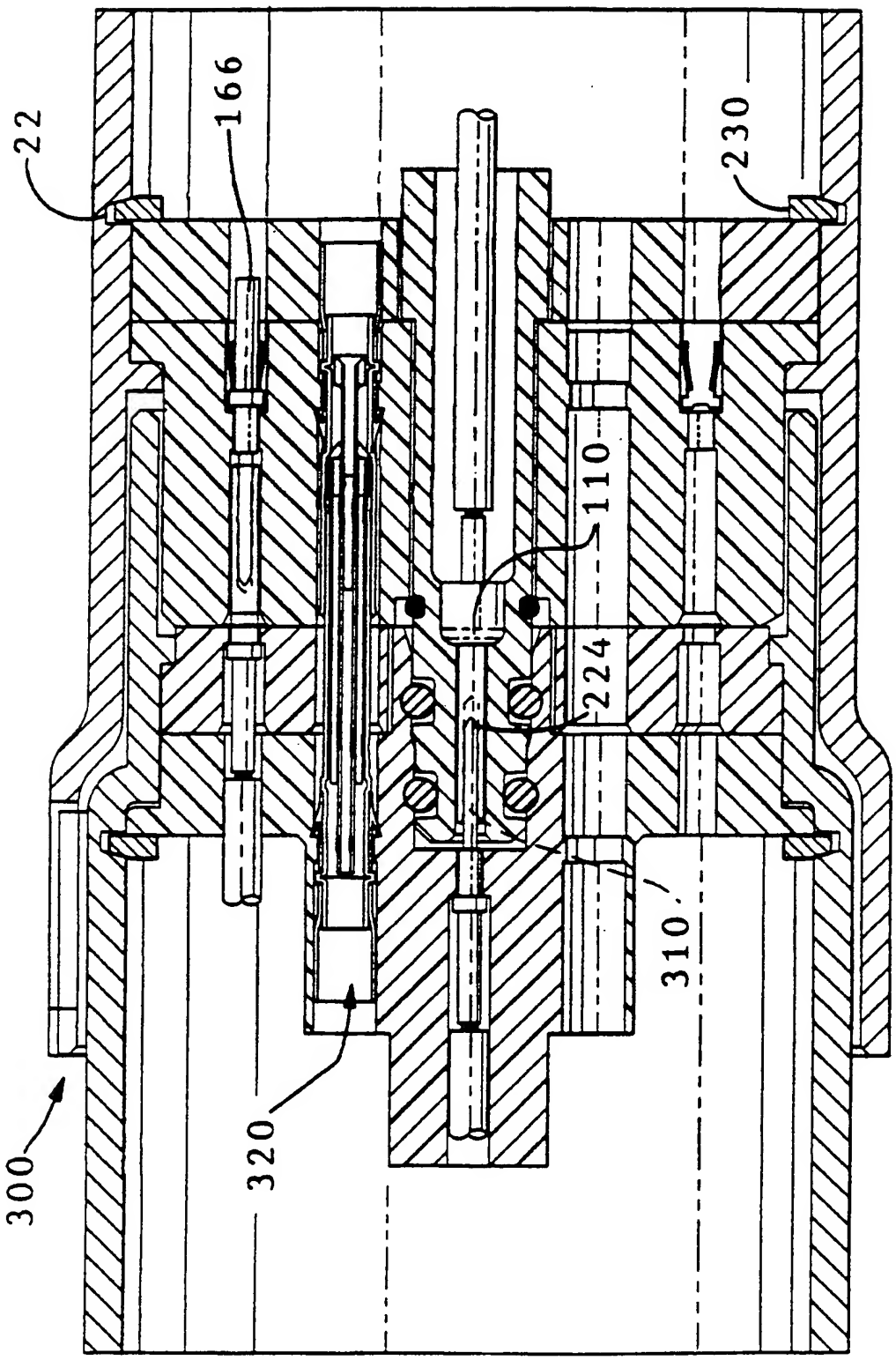

Fig. 17